CHAPTER 13

THE POSTERIOR CALCANEAL OSTEOTOMY FOR RETROCALCANEAL SPUR SYNDROMES: A Five-Year Retrospective Analysis

Dennis E. Martin, D.P.M.

Pathology about the insertion area of the Achilles tendon accounts for some of the most challenging and frustrating cases in the foot specialist's office. The frustration stems from a combination of factors including significant patient symptomatology, less than acceptable success rates for conservative treatment measures, and technically demanding surgical procedures that carry with them exhaustive rehabilitation and unpredictable results. Fortunately, this dilemma has not been ignored by the experts in foot and ankle medicine. The variety of bone anchor systems currently on the market and the resurgence of posterior calcaneal osteotomies as a surgical alternative attest to the continued search for answers to this difficult clinical scenario. Approximately 5 years ago, the author presented his initial thoughts and results on a modified posterior calcaneal osteotomy used to address disorders of the posterior calcaneus and Achilles tendon. Despite the identification of several potential complications, the procedure continues to provide predictable results with a more rapid recovery than traditional procedures. The advantages and disadvantages of this technique will be presented.

PATHOLOGY

There are several clinical syndromes surrounding the Achilles tendon and its insertion area along the posterior calcaneus. It is essential to understand all underlying etiologies, pathologic anatomy, and pathomechanics in order to accurately treat these cases. The potential underlying etiologies are divided into four types metabolic, traumatic, degenerative, and mechanical. Both acute and chronic courses occur with all four types. A vast majority of all chronic cases, regardless of the type, have a co-existing equinus deformity. Although an argument can be made for identifying the equinus deformity as the primary pathologic factor, no good prospective studies have been performed to confirm it. The presence of a gastrocnemius or a combined gastrocnemius-soleus equinus deformity needs to be appreciated preoperatively and addressed intra-operatively to maximize the success of the surgery and minimize the risk for future recurrence. If the degree of equinus deformity is minimal, then aggressive postoperative stretching and rehabilitation may be sufficient.

The pathologic anatomy typically consists of one or a combination of the following structures: the Achilles tendon, the posterior aspect of the calcaneus, a retrocalcaneal exostosis, an inflamed normal anatomic bursa, and an adventitious retrocalcaneal bursa. It is important to associate these structural changes with any underlying metabolic or biomechanical faults that may be present.

The primary pathomechanical consideration is the presence or absence of an equinus deformity. In addition to the traditional etiologies of equinus, any structural or functional abnormality in the limb that results in excessive pronation can have deleterious effects on the Achilles tendon. The overall structure of the foot must also be considered. Foot types such as a rigid forefoot valgus, compensated calcaneal varus, and an uncompensated calcaneal varus increase the risk of developing retrocalcaneal disease.

CONSERVATIVE CARE

Effective conservative care must address both the immediate symptomatology as well as the underlying etiologies. In most instances, this needs to be accomplished in stages. The presenting symptom complex typically includes significant inflammation about the insertion area of the Achilles tendon that is aggravated by activity and shoes. The inflammatory changes can be a result of one factor, or a combination of factors including tendonitis, bursitis, periostitis, and fracture of the spur.

Treatment consists of a combination of immobilization and anti-inflammatory therapeutics.

The degree and form of immobilization will depend on the degree of symptomatology, severity of damage, and patient acceptability. A short-leg non-weight-bearing cast for 4 to 6 weeks is recommended. However, this is not always practical or acceptable to the patient. Alternatives to complete immobilization via casting are fracture boots or Achilles tendon straps (Figs. 1A, 1B). The surgeon and patient have to be realistic if choosing these options, for they do carry a much higher failure and recurrence rate.

Once the immediate inflammatory changes have improved with immobilization, the underlying equinus deformity must be addressed. This is typically accomplished with an aggressive physical therapy program targeted at increasing flexibility to the Achilles tendon and reducing inflammation. In addition, the use of a right angle or adjustable night splint may aid significantly in increasing and maintaining the stretch in the Achilles tendon. Padding and shoe modifications may help alleviate pressure on the posterior heel once the cast is removed.

Figure 1A. Standard weight-bearing immobilization boot.

Figure 1B. Achilles tendon strap/brace.

SURGICAL CORRECTION

Throughout the history of foot and ankle surgery, a variety of techniques ranging from Achilles tendon lengthening to calcaneal osteotomies have been described. The lack of consistency among surgical procedures is a direct reflection of the frustration and disappointment associated with treating this disorder. Although many reasons can be given for this, the most obvious is the inability to resect the posterior spur without violating the attachment fibers of the Achilles tendon. Secondly, simple resection of the posterior spur does not address the underlying equinus deformity when it is present. This may result in continued pain, or at the least increases the likelihood of recurrence. With these considerations in mind, the best surgical alternative would be one that includes both osseous and soft tissue components. Traditionally this required two separate procedures, one to resect the spur and one to address the tight Achilles tendon (Achilles tendon lengthening or gastrocnemius recession). This may increase the rate of complication and result in a much more lengthy recovery process. Lengthening the Achilles tendon in a middle to older age patient can necessitate many months of rehabilitation and may result in permanent weakening. This not only affects day-to-day function, but may predispose the patient to future tendon rupture.

The use of a posterior calcaneal osteotomy to address this symptom complex has also been described. Keck and Kelly described a wedge type osteotomy along the posterior body of the calcaneus to relocate the posterior insertion area and the Achilles tendon to a more anterior and superior position (Fig. 2).[1] Concerned by the potential elongation and posterior displacement of the plantar structures including the calcaneal tubercle, the author presented an alternative osteotomy design in 1995 (Fig. 3).[2] This modification allowed anterior advancement of the posterior calcaneus and Achilles tendon without increasing tension on the plantar soft tissues.

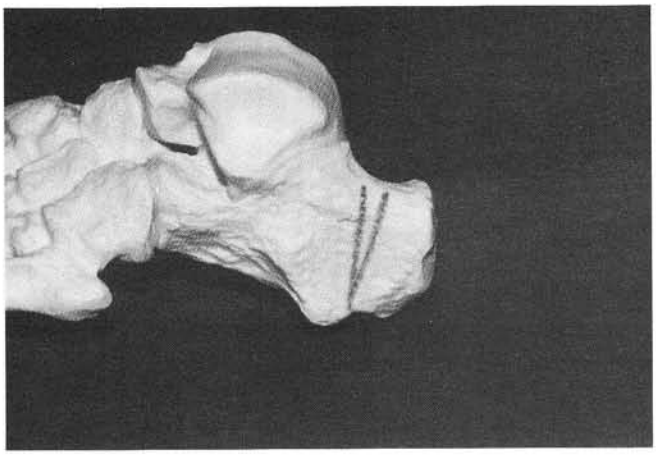

Figure 2. Keck-Kelly calcaneal osteotomy. Note the critical placement of the apex of the wedge.

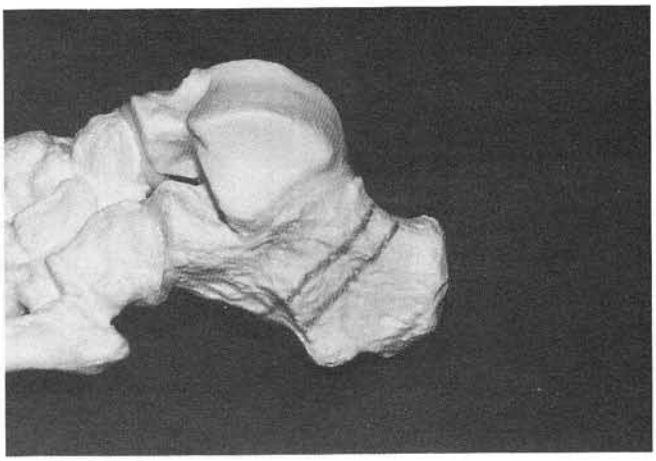

Figure 3. Modified Keck and Kelly. Note the exit arms are distal to the plantar calcaneal tubercles.

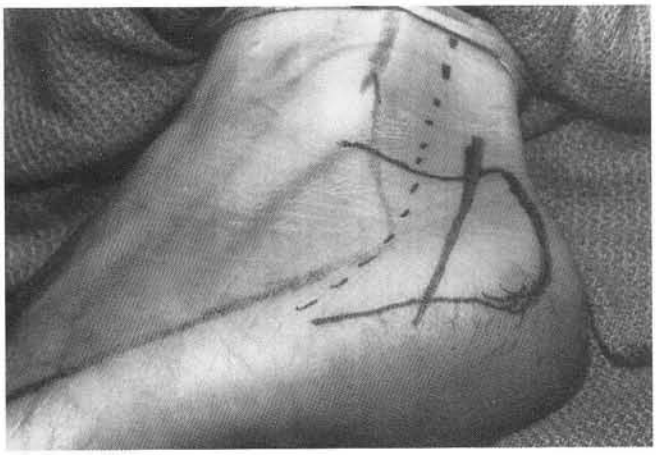

Figure 4A. The initial incision design.

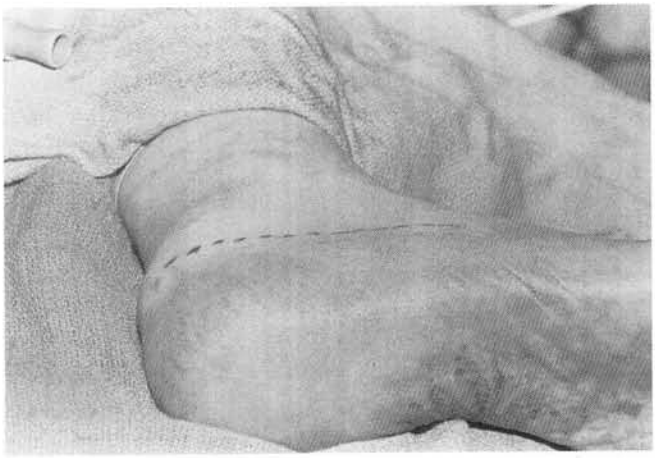

Figure 4B. The current incision design.

Author's Technique

The procedure is typically performed with the patient in a lateral position, with the operative foot placed superiorly. In contrast to the original description, the incision placement has been altered and now lies longitudinally along the anterior-posterior axis of the calcaneus (Figs. 4A, 4B). This change was made in response to the more than desirable number of sural nerve entrapments encountered postoperatively in earlier cases. Careful dissection is then carried down through the superficial fascia, separating it from the underlying deep fascia both superiorly and inferiorly. This allows excellent exposure to the entire posterior body along the lateral aspect of the calcaneus.

The osteotomy design has also been slightly modified since its original description. The current recommendation is to resect a pure rectangular section of bone (4mm to 6mm) from the posterior body of the calcaneus. This change was introduced to allow for a more even fit upon advancing the posterior portion. The osteotomy can be feathered via a reciprocal planing technique if greater correction is needed. This is judged intra-operatively by putting the foot through a dorsiflexory-plantarflexory range of motion, evaluating for continued equinus influence. The osteotomy is then fixated according to surgeon's preference. The author prefers to use metallic staples (Fig. 5). Although the posterior spur is usually left intact, there is some argument to include its resection as part of the procedure. This can be easily accomplished by extending the incision posteriorly and transversely across the back of the calcaneus.

Figure 5. Postoperative radiograph demonstrating the use of metallic staples for fixation of the osteotomy.

Postoperative Care

Postoperatively, the patient is kept in a short-leg cast at maximum dorsiflexion until the osteotomy is healed. Typical consolidation takes approximately 6 to 8 weeks. Once the osteotomy has healed, aggressive physical therapy is initiated to maintain flexibility and increase strength to the Achilles tendon.

Results

Over the past five years, a total of 38 posterior calcaneal osteotomies were performed on 33 patients. Generally speaking, the results were excellent with only modest complications. Only 3 patients had persistent pain at the original site of syptomatology. One of these resulted from a painful non-union of a posterior spur that persisted postoperatively. Recurrence of pain has been limited to two cases of mild tendonitis that responded quickly to nonsteroidal anti-inflammatories and physical therapy.

Complications

The 5-year retrospective analysis has allowed the author to identify several actual and potential complications that were not evident at the time of the earlier article.[2] The most significant complications arose from postoperative sural nerve entrapment. This was seen in 4 patients, three of which went on to require sural nerve resection. This complication has not been seen since the incision modification took place. Four delayed unions at the osteotomy site were identified. All of these healed uneventfully within 6 months. Two of these four patients required external bone stimulation to achieve final healing. On two occasions, it was necessary to remove the internal fixation devices.

CONCLUSION

The posterior calcaneal osteotomy continues to be a viable alternative when surgical intervention is being entertained for retrocalcaneal syndromes. It has shown predictable high rates of success with a much earlier return to a functional weight-bearing status than traditional tendon splitting techniques. If there is strong suspicion of the posterior spur itself being part of the symptom complex, then consideration should be given to removing it in addition to performing the osteotomy.

REFERENCES

1. Keck SW, Kelly PJ: Bursitis of the posterior part of the heel: evaluation of surgical treatment of 18 patients. *J Bone Joint Surg* 47A:267-273, 1965.
2. Martin D: Posterior calcaneal osteotomy: a surgical alternative for chronic retrocalcaneal pain. In Camasta CA, Vickers NS, Carter SR eds. *Reconstructive Surgery of the Foot and Leg Update 95* Tucker, Ga;Podiatry Institute Publishing:1995; 13-18.